

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MATERIAL SPECIFICATION
MS-223: “GEOSYNTHETIC CLAY LINER”

223.1 SCOPE

This specification covers the quality of geosynthetic clay liner (GCL) material and workmanship.

223.2 MATERIAL

The GCL is composed of a layer of high shrink-swell sodium bentonite sandwiched between a layer of 6 ounces per square yard nonwoven polypropylene geotextile and a layer of 3.2 ounces per square yard woven geotextile. The GCL material shall be manufactured by one of the following processes:

- Needle punched process by which the bentonite is encapsulated between the geotextile layers by a mechanical bonding process without the use of any chemical binders or adhesive, or
- Lock stitched to provide internal shear strength and the integrity and consistency to the thickness and unit weight of the material.

The bentonite shall have the following base properties:

- A minimum of 0.75 pound per square foot of high shrink/swell sodium bentonite at 12 percent moisture. If the liner material is manufactured at higher moisture content, it shall still meet the above requirements when adjusted to the 12 percent moisture level.
- Swell index—minimum 24 ml per 2 grams.
- Fluid loss—maximum 18 ml

The GCL shall have an index flux value no larger than 1×10^{-8} m/s

223.3 PACKAGING AND LABELING

All material shall be packaged in individual rolls of a minimum of 3.65 meters wide and with at least 30.5 meters in length on the roll. All rolls shall be labeled and in a wrapping that is resistant to UV light deterioration. The labels on each roll shall identify the length and width of the roll, the manufacturer, the product, lot number, and the roll number.

223.4 TESTING AND QUALITY CONTROL

The following tests shall be performed and the results certified by the manufacturer:

Swell index	ASTM D 5890
Fluid loss	ASTM D 5891
Bentonite mass/unit area	ASTM D 5993
Index flux	ASTM D 5887
Mass/unit area, geotextile	ASTM D 3776

223.5 INSPECTION AND ACCEPTANCE

No liner material shall be accepted for placement in the permanent works that has not been certified by the manufacturer as meeting all specified requirements. No liner material shall be accepted that exhibits any visible defects. The liner material shall be subject to quality assurance testing at any time before and during installation.